Abstract

Liquid crystal devices are formed by a layer of a liquid crystal material enclosed between two cell walls, both carrying electrode structures, and one or both walls treated to align molecules of the liquid crystal material. Most alignment treatment give alignment and surface pretilt with a strong azimuthal and zenithal anchoring energy to contacting liquid crystal molecules. The invention reduces at least one of the azimuthal zenithal or translational anchoring energy to improve switching characteristics and optical performance by allowing movement of liquid crystal molecules at or close to the cell wall. The reduction of anchoring energy may be achieved by an oligomer or short chain polymer which is either spread on the surface or added to the liquid crystal material. The size of oligomer or short chain polymer is low enough that it does not appreciably phase separate from the liquid crystal material. The polymer layer has the characteristics of having imperfect solubility in the liquid crystal material used in the device, of having a physical affinity for the surface of the substrate, and of retaining a substantially liquid like surface at the polymer/liquid crystal interface. The polymer may be formed by polymerisation of reactive low molecular weight materials in solution in the liquid crystal fluid. The resulting solution or dispersion of polymer in liquid crystal is then filled into the cell, and the polymer is allowed to coat the substrate surfaces.